UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,224	02/27/2006	Taoufik En-Najjary	0512-1296	4280

466 7590 09/02/2008

YOUNG & THOMPSON
209 Madison Street
Suite 500
ALEXANDRIA, VA 22314

EXAMINER	
CHAWAN, VIJAY B	
ART UNIT	PAPER NUMBER
2626	

MAIL DATE	DELIVERY MODE
09/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,224	EN-NAJJARY ET AL.	
	Examiner	Art Unit	
	Vijay B. Chawan	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Stylianou et al., ("A system for voice conversion based on probabilistic classification and a harmonic plus noise model," Proceeding of the 1998 IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP '98, Seattle, WA, May 12-15, 1998, vol.1, pages, 131-142).

As per claim 1, Stylianou et al., teach a method for analyzing fundamental frequency information contained in voice samples, characterized in that it comprises at least:

a step for the analysis of the voice samples grouped together in frames in order to obtain, for each sample frame, spectrum-related information and information relating to the fundamental frequency (Sections II, III and IV);

a step for the determination of a model representing the common characteristics of the spectrum and fundamental frequency of all samples (Sections II, III and IV); and,

a step for the determination of a fundamental frequency prediction function exclusively according to spectrum-related information on the basis of said model and voice samples (Sections II, III and IV).

As per claim 2, Stylianou et al., teach the method as claimed in claim 1, characterized in that said analysis step is adapted to supply said spectrum-related information in the form of cepstral coefficients (Sections II, III and IV).

As per claim 3, Stylianou et al., teach the method as claimed in claim 1, characterized in that said analysis step comprises a sub-step for modeling voice samples according to a sum of a harmonic signal and a noise signal, a sub-step for estimating frequency parameters, and at least the fundamental frequency of the voice samples, a sub-step for synchronized analysis of the fundamental frequency of each sample frame, and a sub-step for estimating the spectral parameters of each sample frame (Sections II, III and IV).

As per claim 4, Stylianou et al., teach the method as claimed in claim 1, characterized in that in that it furthermore comprises a step for normalizing the fundamental frequency of each sample frame in relation to the mean of the fundamental frequencies of the analyzed samples (Sections II, III and IV).

As per claim 5, Stylianou et al., teach the method as claimed in claim 1, characterized in that step for the determination of a model corresponds to the determination of a model by mixing Gaussian densities (Sections II, III and IV).

As per claim 6, Stylianou et al., teach the method as claimed in claim 5, characterized in that said model determination step comprises a sub-step for

determining a model corresponding to a mixture of Gaussian densities, and, a sub-step for estimating the parameters of the mixture of Gaussian densities on the basis of the estimation of the maximum resemblance between the spectral information and the fundamental frequency information of the samples and of the model (Sections II, III and IV).

As per claim 7, Stylianou et al., teach the method as claimed in claim 1, characterized in that said for the determination of a prediction function is implemented on the basis of an estimator of the implementation of the fundamental frequency, knowing the spectral information of the samples (Sections II, III and IV).

As per claim 8, Stylianou et al., teach the method as claimed in claim 7, characterized in that said step for determining the fundamental frequency prediction function comprises a sub-step for determining the conditional expectation of the implementation of the fundamental frequency, knowing the spectral information, on the basis of the a posteriori probability that the spectral information is obtained on the basis of the model, the conditional expectation forming said estimator (Sections II, III and IV).

As per claim 9, Stylianou et al., teach a method for the conversion of a voice signal pronounced by a source speaker into converted voice signal whose characteristics resemble those of a target speaker, comprising at least:

a step for determining a function for the transformation of spectral characteristics of the source speaker into spectral characteristics of the target speaker, implemented on the basis of voice samples of the source speaker and the target speaker (Sections II, III and IV); and,

a step for transforming spectral information of the voice signal of the source speaker to be converted with the aid of said transformation function (Sections II, III and IV);

characterized in that it furthermore comprises: a step for determining a fundamental frequency prediction function exclusively according to spectrum-related information for the target speaker, said prediction function being obtained with the aid of an analysis method as in claim 1, and a step for predicting the fundamental frequency of the voice signal to be converted by applying said fundamental frequency prediction function to said transformed spectral information of the voice signal of the source speaker (Sections II, III and IV).

As per claim 10, Stylianou et al., teach the method as claimed in claim 9, characterized in that the said step for determining a transformation function is implemented on the basis of an estimator of the implementation of the target spectral characteristics, knowing the source spectral characteristics (Sections II, III and IV).

As per claim 11, Stylianou et al., teach the step as claimed in claim 10, characterized in that said step for determining a transformation function comprises

a sub-step for modeling the source and target voice samples according to a sum model of a harmonic signal and a noise signal (Sections II, III and IV);

a sub-step for aligning the source and target samples (Sections II, III and IV); and,

a sub-step for determining said transformation function on the basis of the calculation of the conditional expectation of the implementation of the target spectral

characteristics, knowing the implementation of the source spectral characterizations, the conditional expectation forming said estimator (Sections II, III and IV).

As per claim 12, Stylianou et al., teach the method as claimed in claim 9, characterized in that said transformation function is a spectral envelope transformation function (Sections II, III and IV).

As per claim 13, Stylianou et al., teach the method as claimed in claim 9, characterized in that it furthermore comprises a step for analyzing the voice signal to be converted, adapted to supply said spectrum-related information and information relating to the fundamental frequency (Sections II, III and IV).

As per claim 14, Stylianou et al., teach the method as claimed in claim 9, characterized in that it furthermore comprises a synthesis step, enabling the formation of a converted voice signal at least on the basis of the transformed spectral information and the predicted fundamental frequency information (Sections II, III and IV).

As per claim 15, Stylianou et al., teach a system for converting a voice signal pronounced by a source speaker into a converted voice signal whose characteristics resemble those of a target speaker, said system comprising at least: means for determining a function for transforming spectral characteristics of the source speaker into spectral characteristics of the target speaker, receiving, at their input, voice signals of the source speaker and of the target speaker (Sections II, III and IV); and

means for transforming spectral information of the voice signal of the source speaker to be converted by applying said transformation function supplied by the means characterized in that it furthermore comprises:

means for determining the fundamental frequency prediction function exclusively according to spectrum-related information for the target speaker, adapted for the implementation of an analysis method as claimed in claim 1, on the basis of voice samples of the target speaker (Sections II, III and IV); and,

means for predicting the fundamental frequency of said voice signal to be converted by applying said prediction function determined by said means for determining a prediction function to said transformed spectral information supplied by said transformation means (Sections II, III and IV).

As per claim 16, Stylianou et al., teach the system as claimed in claim 15, characterized in that it furthermore comprises:

means for analyzing the voice signal to be converted, adapted to supply, at their output, spectrum-related information and information relating to the fundamental frequency of the voice signal to be converted (Sections II, III and IV); and

synthesis means enabling the formation of a converted voice signal on the basis of at least the transformed spectral information supplied by the means and the predicted fundamental frequency information supplied by the means (Sections II, III and IV).

As per claim 17, Stylianou et al., teach the system as claimed in claim 15, characterized in that said means for determining a transformation function are adapted to supply a spectral envelope transformation function (Sections II, III and IV).

As per claim 18, Stylianou et al., teach the system as claimed in claim 15, characterized in that it is adapted for the implementation of a voice conversion method comprising:

a step for determining a function for the transformation of spectral characteristics of the target speaker, implemented on the basis of voice samples of the source speaker and the target speaker (Sections I and II); and,

a step for transforming spectral information of the voice signal of the source speaker to be converted with the aid of said transformation function (Sections I and II);

a step for determining a fundamental frequency prediction function exclusively according to spectrum-related information for the target speaker, said prediction function being obtained with the aid of an analysis method comprising:

a step of for the analysis of the voice samples grouped together in frame in order to obtain, for each sample frame, spectrum-related information and information relating to the fundamental frequency (Sections II, III and IV);

a step for the determination of a model representing the common characteristics of the spectrum and fundamental frequency of all samples (Sections II, III and IV); and,

a step for the determination of a fundamental frequency prediction function exclusively according to spectrum-related information on the basis of said model and voice samples (Sections II, III and IV); and

a step for predicting the fundamental frequency of the voice signal to be converted by applying said fundamental frequency prediction function to said transformed spectral information of the voice signal of the source speaker (Sections II, III and IV).

As per claim 19, Stylianou et al., teach the method as claimed in claim 3, characterized in that said analysis step is adapted to supply said spectrum-related information in the form of cepstral coefficients (Sections II, III and IV).

As per claim 20, Stylianou et al., teach the method as claimed in claim 4, characterized in that said analysis step is adapted to supply said spectrum-related information in the form of cepstral coefficients (Sections II, III and IV).

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Please see attached form PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vijay B. Chawan whose telephone number is (571) 272-7601. The examiner can normally be reached on Monday Through Friday 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Vijay B. Chawan/
Primary Examiner, Art Unit 2626

vbc
8/29/08